



Protecting your ASSETS

by **Brad Nanna**
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For over 30 years, **Brad Nanna** has been in the Electrical Power Industry promoting solutions and service to customers in the residential, commercial, industrial and utilities markets. His experiences include knowledge and specification influence in electrical power distribution equipment, switchgear, transformers, industrial and motor control. He has held positions in Sales, Marketing, Product Management with primary focus on electrical preventative maintenance (EPM) and electrical safety standards of NFPA and OSHA. Brad is currently employed by IRISS and leading their efforts in inspection Infrared (IR) Thermography and Ultrasound testing. He is also leading the efforts of an electrical Operations Driven Safety and Reliability program (ODSR) for a safer, most reliable electrical asset management system. Brad holds an MBA from Clemson University and a BS degree in electrical engineering from the University of Pittsburgh. He is a member of IEEE, enjoys working with local universities in the development of engineering, sales and marketing classes, and a seasoned speaker on electrical safety and reliability.

NFPA 70B is a standard published by the National Fire Protection Association (NFPA) that provides guidelines for electrical equipment maintenance and testing. It focuses on establishing practices for the proper care and maintenance of electrical systems and equipment to ensure reliable and safe operation.

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The standard covers a wide range of electrical equipment, including power

generation systems, transformers, switchgear, motor control centers, motors, batteries, lighting systems, and more. NFPA 70B introduces the concept of maintenance categories, which are used to determine the appropriate maintenance and testing activities for different types of electrical equipment.



The categories include:

1. **Emergency Maintenance:** Immediate repair or replacement of failed equipment to prevent harm or further damage.
2. **Corrective Maintenance:** Repairing or replacing failed equipment or components after they have been identified as faulty through inspection or testing.
3. **Preventive Maintenance:** Planned maintenance activities conducted at predetermined intervals to prevent equipment failure.
4. **Predictive Maintenance:** Using diagnostic techniques to monitor equipment's condition and predict when maintenance is required.

The standard emphasizes the importance of following manufacturer recommendations and industry best practices for inspection and testing to identify and avoid potential issues or deterioration. It covers visual inspections, thermography, voltage and current measurements, and other testing techniques.

New to the standard as a requirement, but not to the industry, is Thermography testing of electrical connections and terminations. Thermography testing, also known as infrared (IR) thermography or thermal imaging, is a non-destructive testing method that uses infrared cameras to detect and visualize temperature variations in an object or system.

It measures the thermal energy emitted by an object and creates a visual representation called a thermogram or thermal image. Different objects and materials emit thermal energy at varying rates. Thermography testing measures temperature variations and creates a visual representation of heat patterns on the surface of the object or system being inspected.

In order to perform Thermography testing safely, consideration of using inspection Infrared (IR) windows is an absolute must. IR windows protect operators from uncovered and dangerous high currents. They provide a safe and convenient method to conduct thermography

testing on energized electrical systems without the need to remove covers or panels.

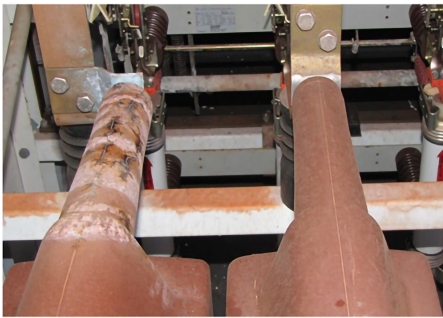
Not only do IR windows provide added safety to inspectors from live "hot" circuits, but they also allow for quick, easy inspections, eliminating the time-consuming process of removing covers or panels for every inspection. They also encourage regular and proactive inspections, enabling the early detection of potential issues before they escalate into costly failures or safety hazards. By avoiding downtime associated with equipment shutdowns and reducing the need for physical access to energized equipment, IR windows can result in significant cost savings.



Photo: IRIS, Shutterstock

In addition to thermography testing, NFPA also recommends Ultrasound testing as a means of protecting your electrical assets, especially for rotating equipment. Ultrasound testing is a non-destructive testing technique that uses ultrasonic waves to detect and analyze high-frequency sounds produced by electrical equipment. It can be used for a variety of applications, including the detection of electrical arcing, corona discharge (partial discharge), and insulation defects.

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Partial discharge (PD) in electrical systems refers to localized electrical discharges that occur within insulation materials or along the surfaces of conductors. It is a phenomenon characterized by the release of a small amount of electrical energy in the form of sparks or pulses. These discharges can occur in high-voltage equipment such as transformers, switchgear, cables, and motors and are the result of various factors, including localized insulation defects, contamination, aging, improper installation, mechanical stress, or high-voltage stress. These conditions can lead to the breakdown of the insulating material and the formation of small electrical arcs or sparks.

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If equipment testing for partial discharge is left unchecked, PD can accelerate the deterioration of insulation materials, reducing their dielectric strength and increasing the risk of complete insulation failure. PD can also generate electromagnetic interference (EMI) and radio frequency interference (RFI), affecting nearby electronic devices and communication systems, and more severely it can lead to the breakdown of insulation and result in electrical faults, equipment failure, or even catastrophic events like electrical arcing or fires.

Monitoring and managing partial discharge activity is essential for ensuring the reliability and safety of electrical systems. Regular inspections, testing, and maintenance practices, such as insulation resistance measurements, partial discharge measurements, and thermography, can help identify and address potential issues before they escalate.

Addressing partial discharge involves identifying and mitigating the underlying causes, repairing or replacing defective insulation, and implementing preventive

maintenance measures to avoid further deterioration.


It is important to note that the specific standards and guidelines for handling partial discharge may vary depending on the type of electrical equipment and the industry. Following applicable industry standards, manufacturer recommendations, and consulting with qualified professionals are essential to effectively address partial discharge concerns in electrical systems.

While Thermography and Ultrasound testing are very important, considered critical, to the maintenance and management of your electrical assets, NFPA also recommends a documented program with well trained, qualified inspectors that are familiar with risk assessment, mitigation plans to potential hazards.

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Documentation: The standard emphasizes the need for proper documentation of maintenance activities. This includes keeping records of inspections, tests, repairs, and replacements to establish an equipment history and aid in future maintenance decisions.





Training and Qualifications: NFPA 70B recognizes the importance of trained personnel for conducting maintenance activities. It provides recommendations for training requirements and qualifications of individuals involved in electrical equipment maintenance.

Risk Assessment: The standard suggests performing risk assessments

to evaluate the potential hazards associated with electrical equipment and prioritize maintenance activities accordingly.

It is important to note that while this summary provides an overview of NFPA 70B, it is always advisable to consult the latest version of the standard for detailed and up-to-date information.



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Like the criticality of an EKG test to one's well-being, so is Thermography and Ultrasound testing to your electrical and mechanical assets providing documented, real-time data...

Protect your ASSETS!